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COMPLETE SPECIFICATION.

Improvements in Water-heating, Distilling and Sterilizing Apparatus.

I, HENRY HARINGTON LEIGH, Assoc. M.Inst.C.E., Fel. Ch. Inst. P.A., practising as Phillips and Leigh, of No 22, Southampton Buildings, Chancery Lane, in the Administrative County of London, Engineer and Patent Agent, do hereby declare the nature of this invention (a communication from James McCartney
5 of 4034, Seventeenth Street, City and County of San Francisco, United States of America), and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to improvements in water heating, distilling and sterilizing apparatus and it consists primarily in the construction of a heating
10 chamber by which the water is admitted successively to distinct thin and wide-spread chambers extended across a line of travel of the heat of combustion, to present the water to the same in very thin sheets; further in the construction whereby the water is introduced into the said chambers on one side of the center thereof and drawn from the other side, thereby compelling the water
15 to travel over the largest area of the said chambers; it further consists in the construction of a containing casing to serve as an adjunct to the heater, while serving as a water jacket to maintain the said casing at a pre-determined temperature and to utilize by absorption the heat which must otherwise be radiated from the said casing, together with regulating devices whereby the flow of water
20 into and through the said casing may be altered to reduce or increase the quantity of water flowing through the said casing, and thereby the resultant heat of the said casing. It further consists in providing suitably connected distilling apparatus with the said heater, so constructed and arranged that the steam generated within the said heater is carried over and condensed in a water
25 receptacle through which the water passing to the heater is passed and by absorbing the heat of the steam to condense the same, thereby conserving the heat needed for the operation of distilling. It further consists in the arrangement of two connected cooling receptacles adapted to receive the distilled water successively; that is to say, the one from the other whereby the distilled water
30 may be drawn from the reservoirs at different temperatures; it further consists in the arrangement of a sterilizing chamber or chambers in which tools to be sterilized may be placed, together with suitable valves for admitting the steam directly to the sterilizing chamber; it further consists in connecting one of the said cooling tanks directly with the heating chamber by means of a pipe having
35 a valve whereby the steam may be directly introduced into the cooling chamber to raise the temperature of the water contained therein; it further consists in a novel construction in the arrangement of the heating stove whereby a portion only of the surface of the stove may be utilized.

In the drawings;

40 Figure 1 is a vertical section of the heater shown in conjunction with a reservoir or intermediate tank used in conjunction with hot water house heating plants, when thus utilized the pipes, 20, and 5, are utilized respectively as outgoing and

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return pipes for the hot water passing to and returning from suitable radiators arranged within the house to be heated. By introducing them into the reservoir, 2, excess pressures on the system are avoided; further this pressure is maintained equally on the system with a full complement of water by means of the inlet pipe, 1, connected with the street or public service by means of the valve, 3, controlled by the float, 4, which arrangement maintains the quantity of water at a constant level in the tank, 2, and therefore a constant head or pressure of water in the heating system. The water enters from the pipe, 5, through the valve, 6, into the lowermost of the heating chambers, 8. The heating chambers, 8 and 10, are constructed as circular discs having the sectional form as shown in Figure 1 of the drawings, they are ultimately connected by means of short pipes, 11, which are screwthreaded into the bosses, 12, which are constructed of malleable metal recessed to receive the upset edges, 13, let into the side of the discs or chambers, 8 and 10. The chambers, 8 and 10, are arranged respectively as shown in the drawing, Figure 1, the former having a central opening which is at the highest position when the chamber 8, is mounted so that the bell or hollow portion of the chamber is turned downward. The succeeding chamber, 10, is inverted and is provided with a closed center or apex in contradistinction to chamber, 8, and the apex is so arranged as to be presented directly over the central opening, 9, of the chamber, 8. By the successive arrangement of these chambers and by carrying the edges of the chambers, 8, outward to nearly reach the sides of the casing, 16, the heat of combustion is compelled to follow a tortuous passage, being alternately diverted by the downturned bell of the chambers, 8, toward the center, and there being received upon the apex of the next succeeding chamber, 10, and being by its walls thrown outward toward and against the inner wall of the casing, 16. Where the pipe, 5, passes through the casing, 16, there is provided a metallic ring, 14. The pipe, 5, is at this point provided with a short extension, 15, which is introduced directly into the space between the walls of the casing, 16. The flow of the water through the pipe, 5, is controlled by a screw-valve, 6, which regulates the aperture in the valve, but is not used as the ordinary means of closing and opening the passage through the pipe, 5, this being performed by the handle, 26, by means of which the water is turned on or off simultaneously with the gas admitted to the stove 21, through the pipe, 23. The purpose of this valve, 6, and the valve, 7, is to regulate the quantity of water which shall pass into the heating chambers, 8 and 10, and into the casing, 16. By regulating the amount of water which shall pass through the heating chamber without diminishing or increasing the heat in the stove it will be seen that the temperature of the water on passing through the heater is thereby regulated. In other words, a small quantity of water will be heated to a higher degree.

When using this system for house heating the stove shown in Figure 3, is utilized, its main advantage and purpose is to produce a large amount of heat quickly in order that the quantity of water contained in the system may be quickly heated, and then by cutting out the compartment, 29, by means of the valve, 31, the heat may be thereby reduced to that which is sufficient to maintain the temperature produced in the water of the system by the rapid heating of the whole surface of the stove. Either of these chambers, 29 or 30, may be cut out, the valves being shown in the drawing of Figure 3, on both of the divided pipe extensions. As a rule, however, I cut out only the chamber, 29, in closing and opening the gas inlet or pipe in the stove, the valve, 32, is used which operates for the supply for both the chambers, 29 and 30. In Figure 1, the stove, 21 is shown without the double compartment while the double compartment is of decided added advantage in the employment of this invention, it is not necessary to the complete utilization.

At the top of the chambers, 8 and 10, they are connected directly to the cross or bridge pipe, 17, which is likewise connected to the space between the walls of the casing 16, and to the outlet pipe, 20. By this arrangement the water

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heated in both the chambers, 8 and 10, and casing, 16, are merged as they pass into the pipe, 20.

- At the junction of the pipe, 20, there is provided a two-way valve 18, and an outlet pipe, 28, leading from the opposite side to the pipe, 20, whereby the turning of the valve 18, by the handle, 19, will introduce the water from the heater directly into the pipe, 20, or pipe, 28. The pipe, 28, may be utilized as a mere overflow pipe for the drawing off of hot water for culinary or other purposes. It may, however, be connected to the distilling and sterilizing apparatus shown in Figure 2.
- In the drawing Figure 2, the complete plant or arrangement of the heater distilling and sterilizing plants is shown in vertical section. The heater as herein shown is varied slightly in its construction, the inlet pipe, 5, in its construction is shown as leading into the casing, 16, directly and not into the lowermost chamber, 8, as shown in Figure 1. The water entering the lowermost chamber is introduced from the upper portion of the chamber, 16, into a down pipe, 33, at the lower end of which it is introduced into the lower chamber, 8. Further the upper chamber, 10, delivers the hot water or steam by means of a pipe, 34, into a tank, 35, having the upper wall conical or dome shaped and from it extends the pipe, 36, leading to the worm, 37, contained in the water tank, 38, of the distilling apparatus. By means of this construction the water entering by the pipe, 5, may be used to produce steam in the chambers, 8 and 10, and deliver the same into the tank, 35, to be carried therefrom by the pipe, 36, and recondensed as distilled water in the coil, 37, and delivered by it into the tank, 39, as distilled water. The tank, 39, has an overflow pipe, 40, connecting it with the larger tank, 41, by means of this arrangement of the tanks 39 and 41, the hereinbefore mentioned purpose of having two tanks of distilled water is carried out.

- In many surgical operations it is necessary that distilled waters of different temperatures should be obtained. By this arrangement the water in, 41, may be maintained at a mean or low temperature, while the water contained in tank, 39, may be raised in temperature. For this purpose the pipe, 42, is employed connecting as it does with the pipe, 36, as the same leaves the heater and entering to near the bottom of the tank, 39. By this arrangement fresh highly heated steam may be immediately introduced into the water contained in the tank, 39, and thereby raise the temperature of the water rapidly and without affecting the temperature of the water contained in the tank, 41. Both the tanks, 39 and 41, are provided with draw-off spigots, 43. In many instances I employ a filter, 44, through which the water entering into the tank, 39, passes to prevent the introduction of any germ which may be prevented by filtration. By means of the spigot, 45, which is introduced into the chamber, 35, wherein the heated steam is introduced directly from the chambers, 8, and 10, I may draw either steam or exceedingly hot water.

- Mounted upon the pipe, 42, I place a small chamber or cabinet having suitable construction for containing surgical instruments to be sterilized. This cabinet, 46, is connected by a short pipe, 47, with the pipe, 42, and the steam is introduced directly into the cabinet, 46, by the valve, 48, which is of the construction known as "two-way," and by which the steam is diverted from the tank, 39, and introduced directly into the cabinet, 46.

- Connected with the pipe, 36, is a suitable steam gauge, 49, used to show the pressure of steam on the apparatus.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. In a water heating, distilling and sterilizing apparatus, the combination with the vertical water heating section, forming the wall of the combustion chamber, of two series of horizontal water heating sections, the sections of one

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series having convexo-concave heating surfaces and the other series having concavo-convex heating surfaces, arranged alternately with each other, said sections being so formed and arranged as to cause the products of combustion to pass through the sections of one of the horizontal series and around and over the outer periphery of the other horizontal series, all of the sections being in communication with one another, a communication between the lower horizontal section and the vertical section, whereby the inflowing water is caused to divide, one part flowing through the horizontal sections and the other part through the vertical sections, both parts uniting at the upper portion of said vertical section, and a draw-off pipe at substantially the highest point of the heater; substantially as described. 5 10

2. In a water heating, distilling and sterilizing apparatus, a water heating disc having an opening therein, and a boss for the attachment of a pipe on said disc about said opening, said boss having a groove in its face adjacent the disc into which groove fits the edge of the disc surrounding the said opening, the inner edge of the opening of the boss being turned over to clasp the said disc edge; substantially as described. 15

3. In a water heating, distilling and sterilizing apparatus, a water heating chamber, a condensing passage, reservoir into which said condensing passage empties, a sterilizing box, a pipe connecting said water heating chamber with said condensing passage, a second pipe leading from said first pipe into said reservoir, and a third pipe leading from said second pipe into said sterilizing box; substantially as described. 20

4. In a water heating, distilling and sterilizing apparatus, a water heating chamber, a condensing passage, a reservoir into which said condensing passage empties, a sterilizing box, a pipe connecting said water heating chamber with said condensing passage, a second pipe leading from said first pipe into said reservoir, and a third pipe leading from said second pipe into said sterilizing box, there being provided at the junction of the first and second pipes a valve adapted to connect said chamber with either the condensing passage or the second pipe, and at the junction between the second and third pipes a valve adapted to connect said first pipe with either the box or the reservoir; substantially as described. 25 30

5. In a water heating, distilling and sterilizing apparatus, an outer wall which is flared to produce a chamber open upon one side, said wall upon the other side converging to produce a throat, a pipe extending from said throat, a bridge across said pipe and extending through the same to said throat, an interior casing wall connected to said bridge and the pipe at said throat and extending to form an inner chamber within said first mentioned chamber, said inner chamber being open upon the side corresponding to the open side of the first mentioned chamber, whereby there is produced a burner having two separate chambers each of which has a separate inlet channel, and a perforated combustion plate supported upon the walls of said chambers, substantially as described. 35 40

Dated the 3rd day of July 1900.

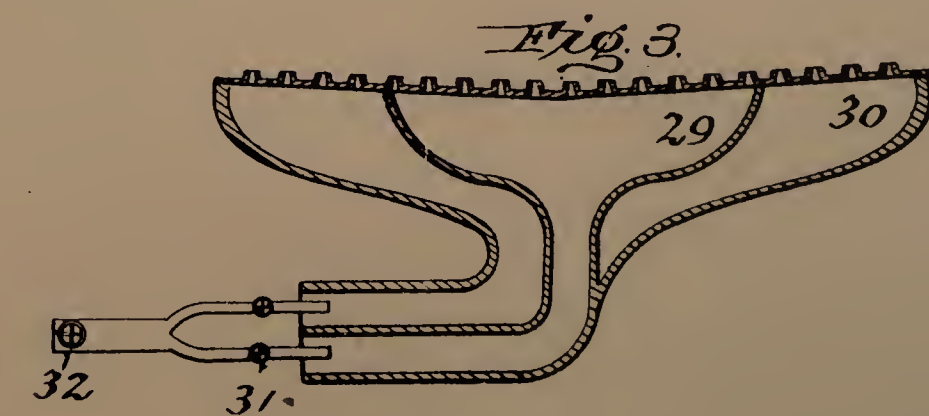
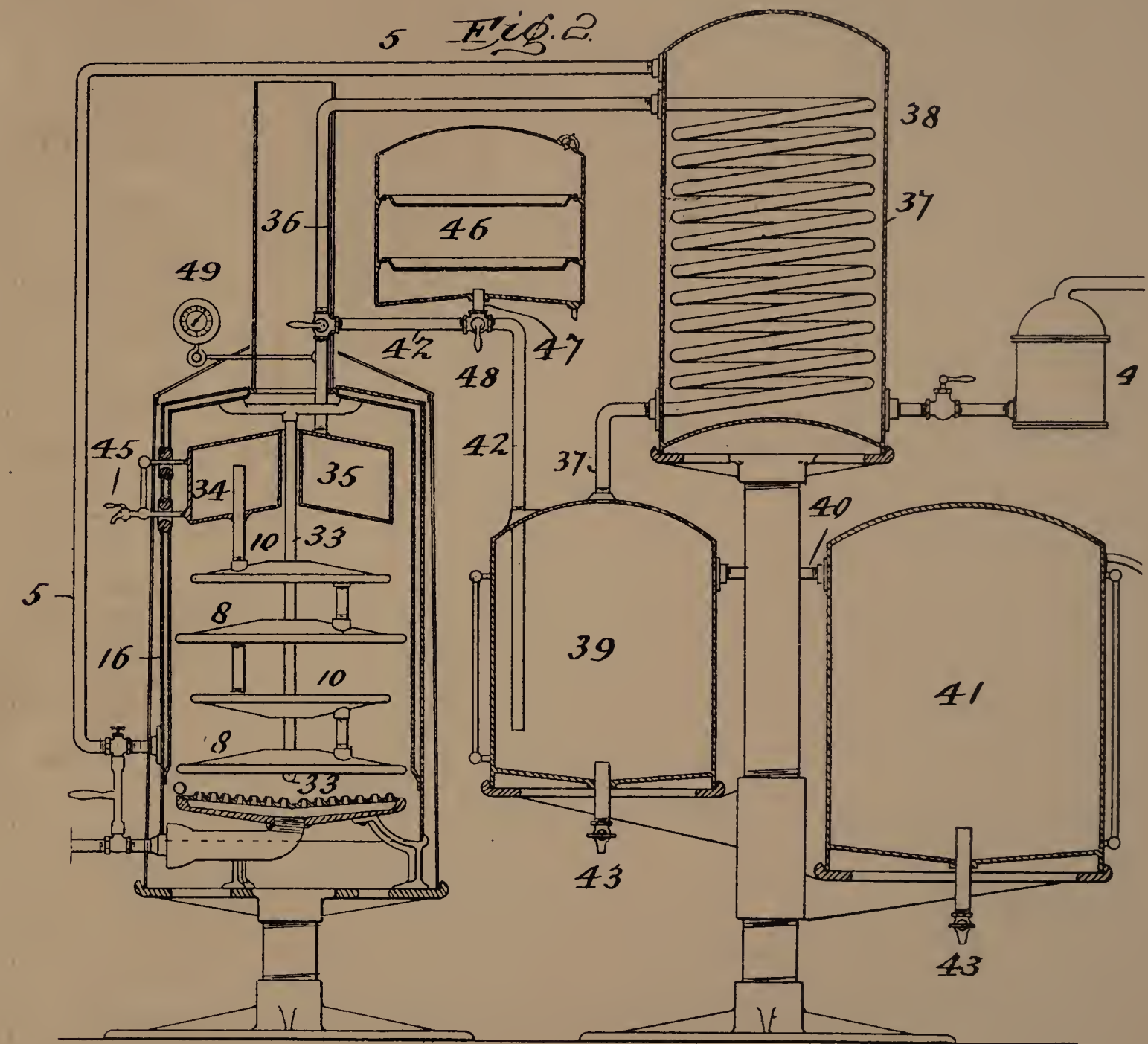
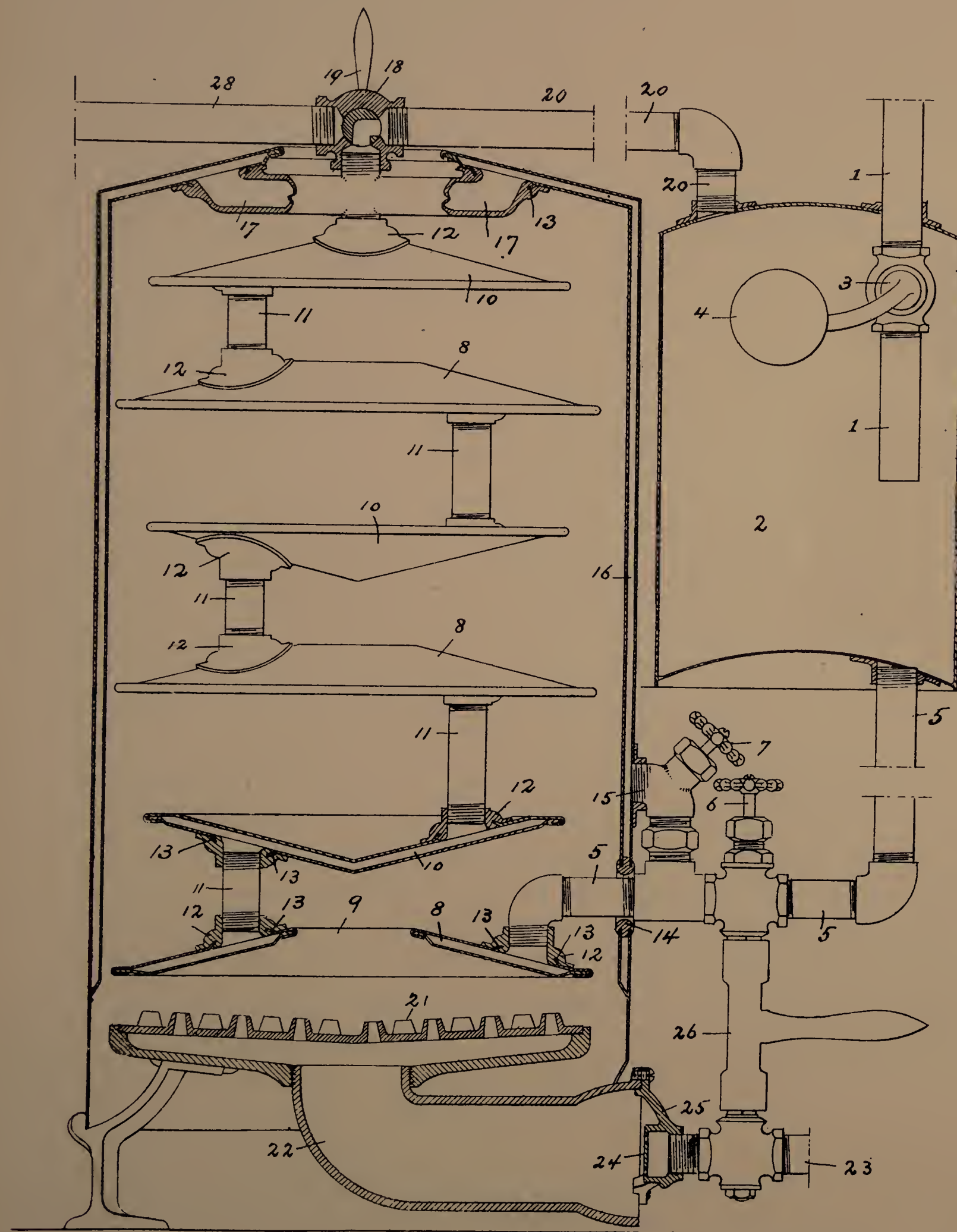
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Fig. 1.



[This Drawing is a reproduction of the Original on a reduced scale.]

